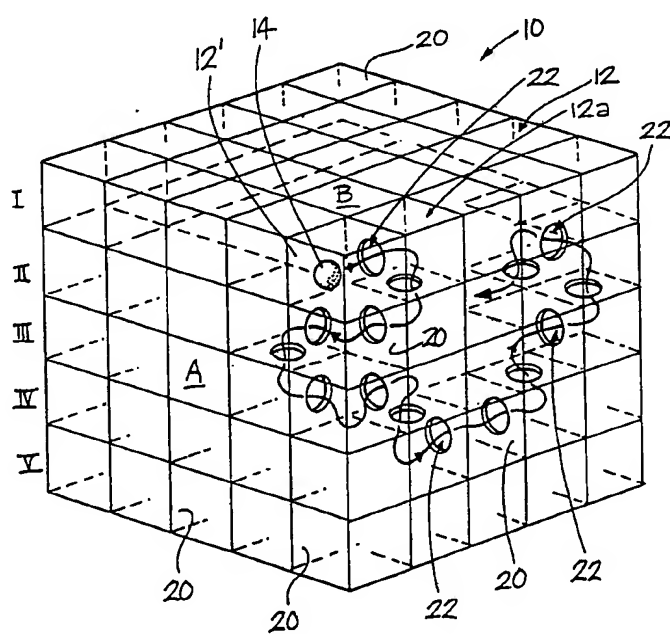


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<p>(21) International Application Number: PCT/AU92/00179</p> <p>(22) International Filing Date: 24 April 1992 (24.04.92)</p> <p>(30) Priority data: PK 5820 26 April 1991 (26.04.91) AU</p> <p>(71)(72) Applicant and Inventor: PRACAS, Victor, Manuel [AU/AU]; Lot 11 Old Coast Road, Lake Clifton, Waroona, W.A. 6215 (AU).</p> <p>(74) Agent: LORD, Kelvin, Ernest; 4 Douro Place, West Perth, W.A. 6005 (AU).</p> <p>(81) Designated States: AT, AT (European patent), AU, BB, BE (European patent), BF (OAPI patent), BG, BJ (OAPI patent), BR, CA, CF (OAPI patent), CG (OAPI patent), CH, CH (European patent), CI (OAPI patent), CM (OAPI patent), CS, DE, DE (European patent), DK, DK (European patent), ES, ES (European patent), FI, FR (European patent), GA (OAPI patent), GB, GB (European patent), GN (OAPI patent), GR (European patent), HU, IT (European patent), JP, KP, KR, LK, LU, LU (European patent), MC (European patent), MG, ML (OAPI patent), MN, MR (OAPI patent), MW, NL, NL (European patent), NO, PL, RO, RU, SD, SE, SE (European patent), SN (OAPI patent), TD (OAPI patent), TG (OAPI patent), US.</p>		<p>Published With international search report.</p>
<p>(54) Title: PUZZLE DEVICE</p> <div data-bbox="470 1092 1136 1722">  </div> <p>(57) Abstract</p> <p>A puzzle device (10) comprises a plurality of chambers (12) with openings (22) therebetween such that a passage is defined from a "start" chamber (12') through the remaining chambers (12) to an "end" chamber (12''), and vice versa. By spatially re-orientating the puzzle device a ball (14) can be made to fall from one chamber (12) to another chamber (12). The passage of the ball (14) through the chambers (12) cannot be seen by the person using the puzzle device; only the sound of ball (14) when it falls into another chamber (12) can be heard. This provides the entertainment and challenge in using and solving the puzzle device (10).</p>		

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TITLE

PUZZLE DEVICE

DESCRIPTION

The present invention relates to a puzzle device.

FIELD OF THE INVENTION

5 The present invention relates a puzzle device which is played by spatially re-orientating the puzzle device. The basic aim is to get a small weight, such as a small ball bearing, from one chamber to another chamber of the puzzle
10 device by spatially re-orientating the puzzle device, but without being able to see the ball bearing.

SUMMARY OF THE PRESENT INVENTION

In accordance with one aspect of the present invention there is provided a puzzle device characterised in that it
15 comprises:

a plurality of chambers, comprising a first set of chambers and a second set of chambers; and,
weight means;

wherein said first set of chambers comprises at least one
20 chamber which communicates with at least one other chamber of said plurality of chambers, and each of said chambers of said second set of chambers communicates with at least two chambers of said plurality of chambers such that said weight means is movable from one of said chambers to
25 another of said chambers upon spatial re-orientation of said puzzle device in a selected manner.

In an embodiment of the present invention described herein, the puzzle device is in the shape of a cube with the chambers arranged inside it. There are openings in the

- 2 -

walls of these chambers so that a small weight, such as a small ball bearing, can pass through these openings from one chamber to another chamber when the puzzle device is turned, i.e. spatially re-orientated, by the person playing with the puzzle device. One chamber is a "start" chamber and another chamber is an "end" chamber. The chamber communicate sequentially from the "start" chamber through to the "end" chamber.

To solve the puzzle device it is necessary to get the ball bearing from the "start" chamber to the "end" chamber (or vice versa) by repeatedly turning the puzzle device so that the ball bearing continues to fall from one chamber into the next chamber until it finally comes into the "end" chamber. However, the outside of the puzzle device is opaque (except for the "start" and "end" chambers) so that the passage of the ball bearing through the chambers cannot be seen. This means that the person playing with the puzzle device must listen for the sound of the ball bearing as it falls from one chamber to the next to know that it has advanced. Then, the person knows that he/she must again turn the puzzle device until the ball bearing falls into the next chamber, and so on. A counter is provided to count the number of times the puzzle device is spatially re-orientated. A timer is provided to time the time taken for the person to solve the puzzle device.

The puzzle device is formed as a three (3) dimensional array of the chambers.

Preferably, the puzzle device is in the shape of a cube.

BRIEF DESCRIPTION OF THE DRAWINGS

- 3 -

Figure 1 is a first perspective view of an embodiment of a puzzle device in accordance with the present invention, showing the counter device and time mechanism in broken lines;

5 Figure 2 is a second ("see-through") perspective view of the puzzle device shown in Figure 1, showing part of the arrangement of chambers of the puzzle device;

Figure 3 is a perspective view of the counter device of the puzzle device shown in Figure 1;

10 Figure 4 is a cross-sectional view through the middle of the counter device shown in Figure 3;

Figure 5 is a perspective view of an alternative embodiment of the counter device of the present invention;

Figure 6 is a perspective view of a further alternative
15 embodiment of the counter device of the present invention;
and,

Figure 7 is an embodiment of a specific sequence for the passage or path through the chambers of the puzzle device.

DESCRIPTION OF THE INVENTION

20 In Figures 1 and 2 there is shown a puzzle device 10 comprising chambers shown generally at 12 (in Figure 2) and a weight which may be in the form of a ball or ball bearing 14 (also shown in Figure 2).

Each of the chambers 12 communicates with two other
25 chambers 12 except for a first ("start") chamber and a second ("end") chamber, which are identified as 12' and 12", respectively, for easy reference. The first and second chambers 12' and 12" form a first set of chambers and the remainder of the chambers 12 form a second set of

- 4 -

chambers. The first chamber 12' communicates with one of chambers 12 of the second set of chambers, and the second chamber 12" communicates with another one of the chambers 12 of the second set of chambers.

- 5 A path or passage is defined from the first chambers 12', through the chambers 12 of the second set of chambers to the second chamber 12" (and vice versa). The chambers 12 are formed by walls 20. The walls 20 are provided with openings 22 by which chambers 12 communicate.
- 10 The walls 20 of the first chamber 12' are provided with an opening 22 such that the first chamber 12' communicates with one of the chambers 12 of the second set of chambers. The chamber of the second set of chambers which communicates with the first chamber 12' can be seen in
- 15 Figure 2 and is identified at reference numeral 12a. Thus, the first chamber 12' has one opening 22 by which it communicates with the chamber 12a, which is one of the chambers of the second set of chambers. Similarly, the walls 20 of the second chamber 12" are provided with an
- 20 opening 22 such that the second chamber 12" communicates with another one of the chambers 12 of the second of chambers (not being the chamber 12a). However, the chamber of the second set of chambers with which the second chamber 12" communicates is obscured in the drawings but for ease
- 25 of reference is hereinafter referred to as the chamber 12b. Thus, the second chamber 12" has one opening 22 by which it communicates with a chamber 12b of the second set of chambers.
- The walls 20 of the chambers 12 of the second set of

- 5 -

chambers are provided with two openings 22 such that each chamber 12 of the second set of chambers communicates with two other chambers 12 of the puzzle device 10. Thus, each of the chambers 12 of the second set of chambers
5 communicates with two other chambers 12 of the second set of chambers, except for the chambers 12a and 12b. The chamber 12a communicates with one chamber 12 of the second set of chambers along with the first chamber 12'. Similarly, the chamber 12b communicates with one chamber 12
10 of the second set of chambers along with the second chamber 12". Accordingly, each of the chambers 12a and 12b (of the second set of chambers) also communicates with two chambers 12 of the puzzle device 10.

In this way, the chambers 12 of the puzzle device 10
15 communicate sequentially to form the path or passage hereinbefore described.

The chambers 12 which are in communication with one another are adjacent.

The puzzle device 10 has the chambers 12 arranged in a
20 three (3) dimensional array. In such arrangement, the chambers 12 are located inside the body of the puzzle device and also adjacent the outside surface/s 23 of the puzzle device 10.

The first chamber 12' is positioned such that at least part
25 of its walls 20 is formed as part of an outside surface 23 of the puzzle device 10. Further, at least a portion of aforesaid part of the walls 20 of the first chamber 12' is formed such that interior of the first chamber 12' is visible, e.g. by being transparent or translucent. The

- 6 -

second chamber 12" is positioned and formed in a similar manner.

The outside surface/s 23 of the puzzle device 10 is opaque (except for the walls 20 of the first chamber 12' and second chamber 12" as hereinabove described) such that the interior of the puzzle device 10 is not visible. Preferably, the first and second chambers 12' and 12" are visibly distinguishable from the exterior of the puzzle device 10, e.g. their walls 20 may be tinted in different colours.

The puzzle device 10 also comprises a counter device. The counter device is used in counting how many times the puzzle device is spatially re-orientated as will be hereinafter described.

Figures 3 and 4 show an embodiment of a counter device 24. The counter device 24 comprises a chamber 26 defined by walls 28. The chamber 26 is sealed. Each of the walls 28 is provided with a pair of electrical contacts 30 on the inside of the chamber 26. Electrical leads 32 extend from the electrical contacts 30 to electronic counter circuitry 34.

An electrically conductive mass of material 36 is contained inside the chamber 26. The mass of material 36 completes an electric circuit when it comes into contact with the pair of electrical contacts 30 on a wall 28 of the chamber 26.

Preferably, the mass of material 36 is a blob of mercury. Each time the puzzle device 10 is spatially re-orientated such that the mass of material 36 moves from the contacts

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- 30 of one of the walls 28 of the chamber 26 onto the contacts 30 of another one of the walls 28, an electrical circuit is completed. This action registers on the electronic counter circuitry 34 which keep a cumulative tally of the number of such movements of the mass of material 36, and therefor, of the number of re-orientations of the puzzle device 10.
- Preferably, the counter device 24 is provided substantially at the centre of the puzzle device 10.
- 10 The puzzle device 10 further comprises a timer 38 which includes start, stop and reset functions.
- An electronic display 40 is provided on an outside surface of the puzzle device 10, mounted on a small panel 42.
- The electronic display 40 may be a liquid crystal display.
- 15 The electronic display 40 may function as a digital display to display the cumulative number of re-orientations undergone by the puzzle device, e.g. in an incremental manner. The electronic counter circuitry 34 can be reset to recommence counting. Alternatively, the electronic display 40 may function to display elapsing time, i.e. as a digital display for the timer 38.
- Controls (not shown) may be provided adjacent the electronic display 40 for operation and selection of the display functions.
- 25 A power source (not shown), e.g. a cell or battery, may be provided behind the electronic display 40, adjacent the electronic counter circuitry 34 and the timer 38. The power source powers the electronic counter circuitry 34, timer 38 and electronic display 40. The power source can

- 8 -

be accessed for replacement, etc, by removing the panel 42 which carries the electronic display 40.

The electronic counter circuitry 34, timer 38 and power source take up space in the interior of the puzzle device 10 and are not visible from the exterior thereof. Only the electronic display 40 on an outside surface 23 of the puzzle device 10 is visible.

Preferably, the puzzle device 10, chambers 12 and the counter device are of substantially oblong or cube form, as shown in the drawings 1 to 4.

With both the puzzle device 10 and chambers 12 being of cube form, the first and second chambers 12' and 12" may be provided at diagonally opposed corners of the puzzle device 10. This is best seen in Figure 1. Additionally, the three walls 20 of the first and second chambers 12' and 12" that are at the outside surface 23 of the puzzle device 10 are substantially transparent or translucent such that the interiors of the first and second chambers 12' and 12" are visible.

The provision of the puzzle device 10 as a cube means that it has six exterior faces which make up its outer surface/s 23.

Similarly, the provision of the chambers 12 as cubes means that each chamber 12 is defined by six walls 20, with adjacent chambers 12 sharing a common wall 20.

With the puzzle device 10 and the chambers 12 being of cube form, the puzzle device 10 is in the form of a 3 dimensional cubic array of chambers 12 of cube form, as is shown in Figures 1 and 2.

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Preferably, the cube form puzzle device 10 is five (5) chambers 12 cubic. This produces $5 \times 5 \times 5 = 125$ chambers 12. However, the central space in the puzzle device 10 is occupied by the counter device 24. The electronic counter circuitry 34, timer 38 and power source take up additional space; the space that would be taken up by five (5) chambers 12 is allocated to this. In this way a total space that would have been occupied by six (6) chambers 12 is taken up, and extends from one face (outer surface 23) of the puzzle device 10 into the centre thereof. This leaves $125 - 6 = 119$ (useable) chambers 12 through which the ball 14 may pass. An odd number of useable chambers 12 is found desirable so that the first and second chambers 12' and 12'' may be positioned at diagonally opposed corners of the puzzle device 10.

The counter device 24 shown in Figures 1, 3 and 4 is of cube form. Thus, there are six (6) walls that go to make up the chamber 26 of the counter device 24. The respective pairs of contacts 30 are then positioned in substantially the middle of each wall 28. The chamber 26 conveniently takes up the space that would have been occupied by a central chamber 12.

An alternative embodiment of a counter device 44 is shown in Figure 5.

The counter device 44 comprises a chamber 46 which has a spherical wall 48. The counter device 44 has six (6) sets of contacts 30 with leads 32 extending therefrom. The six (6) sets of contacts 30 are symmetrically spaced. A mass of material 36 (obscured) is contained in the chamber 46 of

- 10 -

the counter device 44.

A further embodiment of a counter device 50 is shown in Figure 6.

The counter device 50 shown in Figure 6 comprises a chamber
5 52 which has six (6) lobe like forms 54 which meet at the
centre. The lobe like forms 54 are symmetrically spaced
and meet at a central core 56. Respective pairs of
contacts 30 are provided at the outer extremity of each
lobe like form 54. Leads 32 extend from the contacts 30.
10 The counter devices 24, 44 and 50 are provided with six (6)
sets of contacts 30 so that one set of contacts 30
corresponds with a respective face (outer surface 23) of
the puzzle device 10 of cube form. In each case, the
counter device 24, 44 or 50 is arranged in the middle of the
15 puzzle device 10 such that a set of contacts 30 faces a
respective face of the puzzle device "square on". In this
way, when the puzzle device 10 is spatially re-orientated
through substantially 90° such that a new face is
uppermost, the mass of material 36 falls onto a new set of
20 contacts 30 to register the spatial re-orientation of the
puzzle device 10.

The manner of use and operation of the puzzle device 10
will now be described.

The object of the puzzle device 10 is to move the ball 14
25 from the first chamber 12', through the chambers 12 of the
second set of chambers to the second chamber 12" (or vice
versa) by repeatedly spatially re-orientating (or turning)
the puzzle device 10 through substantially 90° about a
substantially horizontal axis. Conveniently, the puzzle

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device 10 is held with an outer surface 23 uppermost...
Thus, if at the start the ball 14 is in the first chamber
12', the puzzle device 10 is spatially re-orientated
through substantially 90° such that the ball 14 falls
5 through the opening 22 into the chamber 12 that is adjacent
the first chamber 12'. This spatial re-orientation
procedure is repeated until the ball 14 passes into the
next chamber 12, and so through all of the chambers 12 of
the second set of chambers and falls into the second
10 chamber 12".

However, since the outside surface/s 23 of the puzzle
device 10 is/are opaque (except for the walls 20 of the
first and second chambers 12' and 12"), this means that the
user is unable to see the passage of the ball 14 through
15 the chambers 12 of the second set of chambers. The user
must listen for the sound of the ball as it falls from one
chamber 12 to the next chamber 12 to know it has advanced.
The user then knows that he/she must then again spatially
re-orientate the puzzle device 10 so that the ball 14 can
20 fall into the next chamber 12, and so on. However, the
user must also use his/her memory and skill in spatially
re-orientating the puzzle device 10 to ensure that the ball
14 continues to move in the desired direction through the
passage defined by the chambers 12; thus, if the user makes
25 an error he/she could spatially re-orientate the puzzle
device 10 so that the ball 14 falls back into the last
chamber 12 from which it came, rather than into the next
chamber 12. In this way, the puzzle device 10 provides
entertainment and challenge to the user in solving the

- 12 -

puzzle device 10.

Figure 2 shows the passage defined by the first flow chambers 12. To get the ball 14 into the chamber 12a, it is necessary that the puzzle device 10 is spatially re-orientated so that the face A becomes uppermost. To then get the ball 14 from the chamber 12a into the next chamber 12, it is necessary that the puzzle device 10 is returned to the spatial orientation shown in Figure 2 (i.e. with the face 13 uppermost). This process is continued until the ball passes through all the chambers 12.

The puzzle device 10 may be re-orientated once only or more times before the ball 14 falls into the net chamber 12. The aim is to have the ball 14 pass through all the chambers 12 in the least number of spatial orientations of the puzzle device 10.

Figure 7 shows an embodiment of a specific sequence for the passage through the chambers 12. The five layouts of Figure 7 each represent the chambers 12 of one of the five levels I, II, III, IV and V of the puzzle device 10. The numbers in these layouts show the sequential path that is followed by the ball 14 through the different levels of chambers 12.

Each time the puzzle device 10 is spatially re-orientated through substantially 90° (about a substantially horizontal axis), the mass of material 36 will move from one pair of contacts 30 to another. In this regard, the counter devices 24, 44 and 50 function in similar manner). As previously described, this completes an electrical circuit and the electronic counter circuitry 34 counts this as a

- 13 -

spatial re-orientation of the puzzle device 10. (Spatial orientations about a substantially vertical axis are not counted). The electronic counter circuitry 34 maintains a cumulative tally of the number of times the puzzle device

5 is so spatially re-orientated from the start to the end. This tally is displayed in digital form on the display 40. The timer 42 also times the time elapsed from commencing to solve the puzzle until the end. This can also be displayed on the display 40.

10 Modifications and variations such as would be apparent to a skilled addressee are deemed within the scope of the present invention.

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CLAIMS

1. A puzzle device characterised in that it comprises:
a plurality of chambers, comprising a first set of chambers
and a second set of chambers; and,
5 weight means;
wherein said first set of chambers comprises at least one
chamber which communicates with at least one other chamber
of said plurality of chambers, and each of said chambers of
said second set of chambers communicates with at least two
10 chambers of said plurality of chambers such that said
weight means is movable from one of said chambers to
another of said chambers upon spatial re-orientation of
said puzzle device in a selected manner.
2. A puzzle device according to claim 1, characterised in
15 that said first set of chambers comprises a first chamber
and a second chamber, said first chamber communicates with
one of said chambers of said second set of chambers and
said second chamber communicates with another one of said
chambers of said second set of chambers, and the remainder
20 of said chambers of said second set of chambers each
communicate with two chambers of said second set of
chambers, such that a path or passage is formed from said
first chamber through said chambers of said second set of
chambers to said second chamber.
- 25 3. A puzzle device according to claim 2, characterised in
that said chambers comprise wall means and said chambers
communicate by openings in said wall means.
4. A puzzle device according to claim 3, characterised in
that each of said first and second chambers have at least a

- 15 -

portion of their respective wall means which is provided at an outer surface of such puzzle device and each said portion has at least a part that enables the inside of said first and second chambers to be visible and the remainder
5 of the outer surface, or surfaces, of said puzzle device is substantially opaque.

5. A puzzle device according to any one of claims 2 to 4, characterised in that said first and second chambers are distinguishable.

10 6. A puzzle device according to any one of claims 2 to 5, characterised in that said chambers are arranged in a three dimensional array.

7. A puzzle device according to claim 6, characterised in that said puzzle device is of substantially cube form and
15 said chambers are of substantially cube form.

8. A puzzle device according to claim 7, characterised in that said first and second chambers are positioned at diagonally opposed corners of said puzzle device.

9. A puzzle device according to any one of claims 1 to 8,
20 characterised in that counter means, counter circuitry means and display means are provided, said counter means is used in counting the number of times said puzzle device is spatially re-orientated in said selected manner, said counter circuitry means keeps a tally of said number of
25 times and said display means visibly displays said number.

10. A puzzle device according to claim 9, characterised in that said counter means comprises chamber means containing an electrically conductive mass means, and pairs of electrical contacts provided on the inside surface of said

- 16 -

chamber means and connected with said counter circuitry such that each time said puzzle device is spatially re-orientated in said selected manner said electrically conductive mass means falls onto another pair of said electrical contacts to complete a circuit and this is tallied by said counter circuitry means as said puzzle device having been spatially re-orientated.

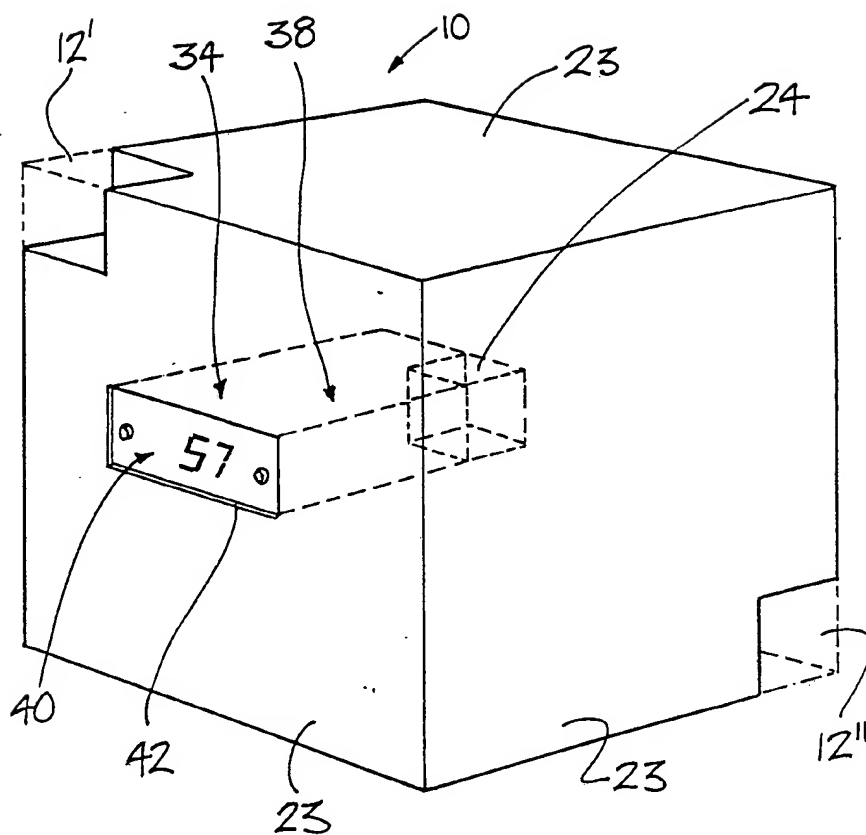
11. A puzzle device according to claim 10, wherein six pairs of said electrical contacts are provided and are substantially symmetrically spaced on said inside surface of said chamber means.

12. A puzzle device according to any one of claims 1 to 11, wherein said selected manner of spatial re-orientation of said puzzle device is a spatial re-orientation about a substantially horizontal axis.

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FIG. 1.

SUBSTITUTE SHEET

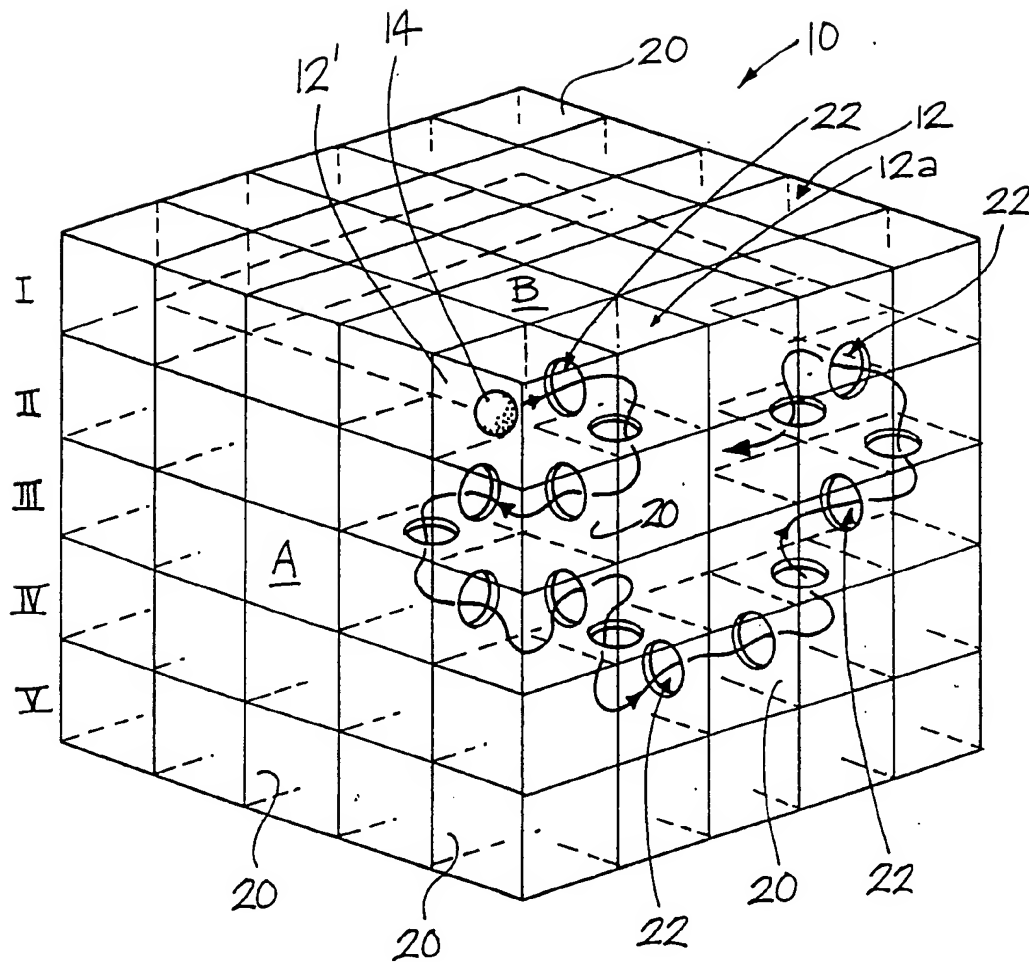


FIG. 2. V

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FIG. 3

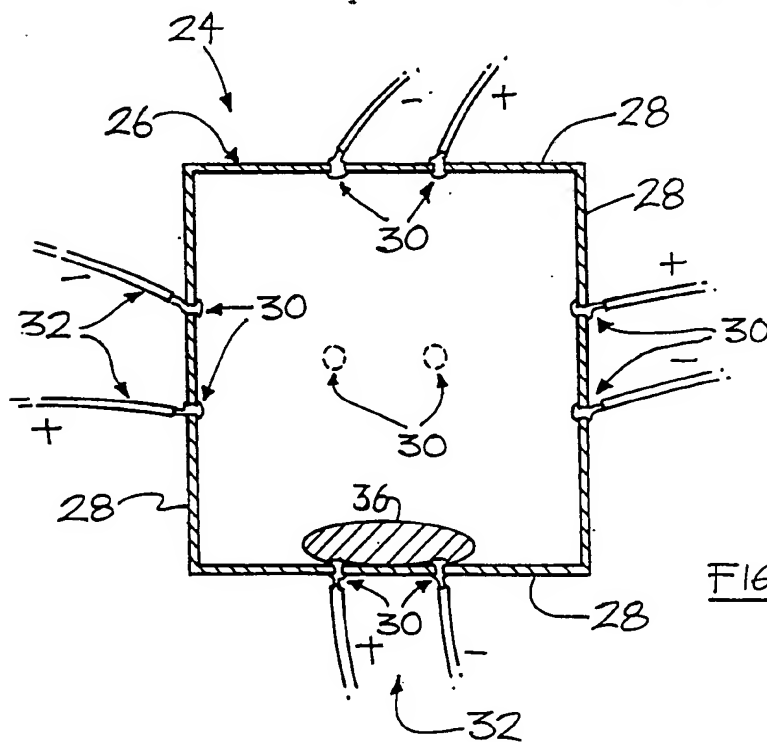
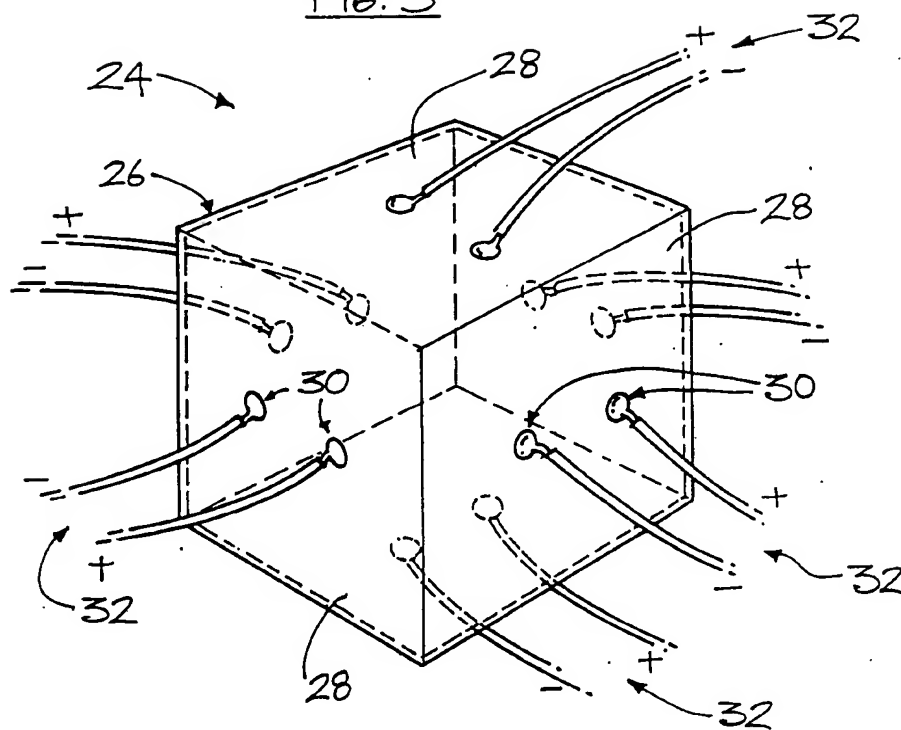


FIG. 4.

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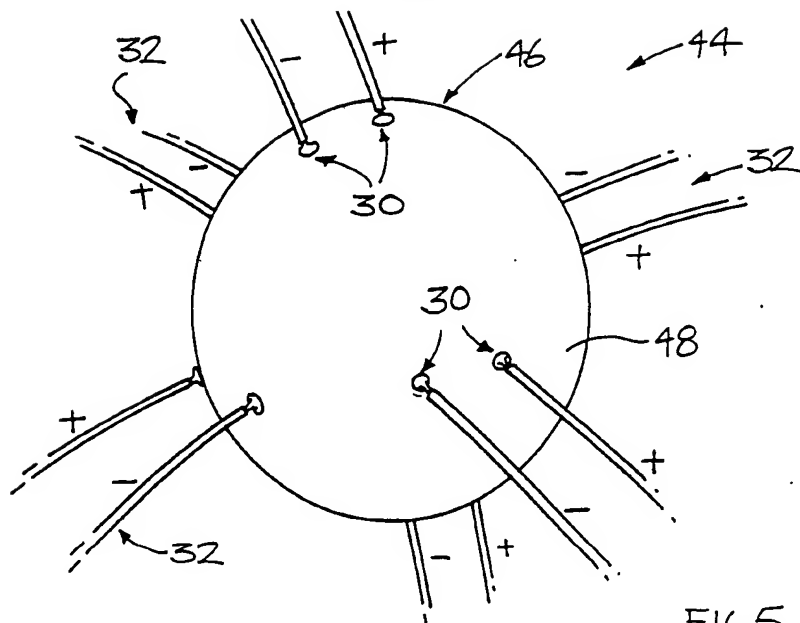


FIG. 5.

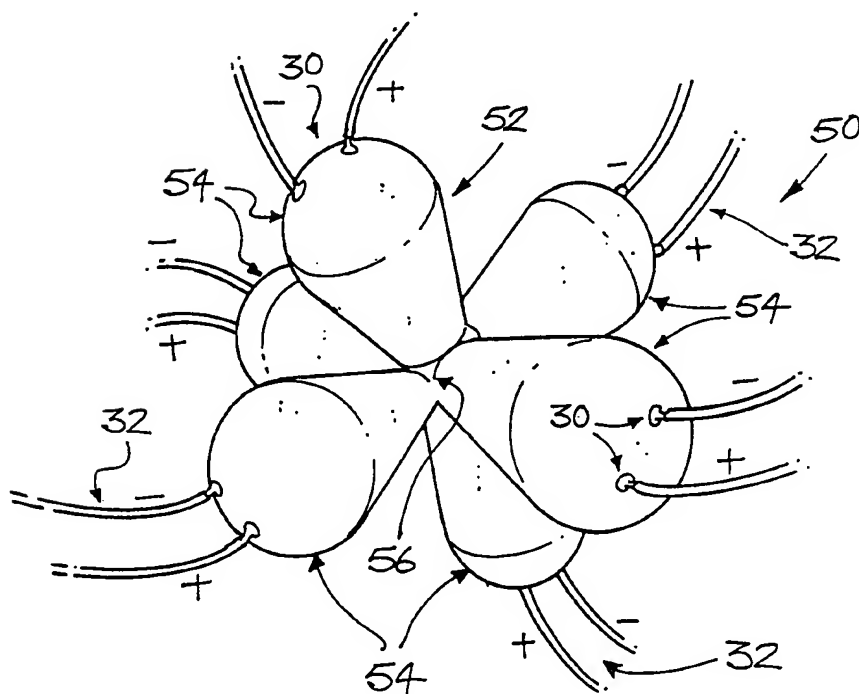


FIG. 6.

5/5

1	4	35	38	39						9	10				45
2	3	34	41	40						12	11				46
29	30	31	50	51						13	16				47
28	27	60	59	52						20	17	64	67	68	
25	26	61	56	55						21	22	65	66	89	

I

8	5	36	37	44										
7	6	33	42	43										
14	15	32	49	48										
19	18	63	58	53										
24	23	62	57	54										

II

9	10													
12	11													
13	16													
20	17	64	67	68										
21	22	65	66	89										

III

91	98	103	104	107						103	104	107
90	89	100	111	108						111	111	108
87	88	99	112	115						112	112	115
84	79	76	117	116						117	117	116
83	80	75	118	119						118	118	119

V

94	93	102	105	106						102	105	106
95	96	101	110	109						101	110	109
86	97	98	113	114						98	113	114
85	78	77	72	71						77	72	71
82	81	74	73	70						74	73	70

IV

Fig. 7

INTERNATIONAL SEARCH REPORT

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶		
According to International Patent classification (IPC) or to both National Classification and IPC Int. Cl. ⁸ A63F 7/04, 9/08		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
IPC	A63F 7/04, 9/08	
Documentation Searched other than Minimum Documentation to the extent that such Documents are included in the Fields Searched ⁸		
AU : IPC as above		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹		
Category [*]	Citation of Document, ¹¹ with indication, where appropriate of the relevant passages ¹²	Relevant to Claim No ¹³
X	GB,A, 2211748 (TSUTOMU WATANABE) 12 August 1989 (12.08.89) (See pages 1-9)	1, 12
X	US,A, 4824098 (HUANG, HONG Y.) 25 April 1989 (25.04.89) (See columns 1-4)	1, 12
X	GB,A, 2205253 (GAUNTLETT, DANIEL V.) 7 December 1988 (07.12.88) (See pages 1-11)	1, 12
A	GB,A, 752110 (THOMAS, PERCIVAL R) 4 July 1956 (04.07.56) (See pages 1-3)	
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IV. CERTIFICATION		
Date of the Actual Completion of the International Search 3 August 1992		Date of Mailing of this International Search Report 11 August 1992 (11.08.92)
International Searching Authority AUSTRALIAN PATENT OFFICE		Signature of Authorized Officer J THOMSON <i>John Thomson</i>

**ANNEX TO THE INTERNATIONAL SEARCH REPORT ON
INTERNATIONAL APPLICATION NO. PCT/AU 92/00179**

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member	
GB	2211748	JP 1013631	US 4861036
US	4824098	GB 2222373	
GB	2205253		

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